

GENERAL MOTORS TRANSMISSION CONTROLLED SPARK

DESCRIPTION

1970 TCS SYSTEM

TCS system used on 1970 General Motors vehicles is designed to regulate distributor vacuum advance. Vacuum is permitted to distributor vacuum advance unit only at cold start-up, high gear operation and in some instances, "Hot" override. System consists of a vacuum advance solenoid, idle stop solenoid, transmission switch, relay switch and a coolant temperature override switch.

1972-74 TCS SYSTEM

6-Cylinder & Small V8 Engines — Control of exhaust emissions emitted by vehicles using 6-cylinder or small block V8 engines, is accomplished by eliminating ignition vacuum advance when vehicle is operated in low forward gears. In addition, on 1974 vehicles vacuum advance is also eliminated when vehicle is operated in reverse or neutral. System consists of an idle stop solenoid, time delay relay, vacuum advance solenoid, transmission switch and a coolant temperature override switch.

Mark IV V8 Engines — Control of exhaust emissions emitted by vehicles using Mark IV V8 engines is accomplished by eliminating ignition vacuum advance when vehicle is operated in low forward gears. In addition, on 1974 vehicles vacuum advance is also eliminated when vehicle is operated in reverse or neutral. System consists of an idle stop solenoid, vacuum advance solenoid, transmission switch and a coolant temperature override switch.

OPERATION

Vacuum Advance Solenoid — This electrically operated two-position plunger control valve serves to supply or deny vacuum to distributor vacuum advance unit. In energized position, spring loaded plunger seats against vacuum inlet and opens distributor advance unit to clean air vent. In de-energized position, plunger opens vacuum port from carburetor to advance unit. In opening vacuum port, plunger simultaneously closes clean air vent to atmosphere at opposite end. Vent to atmosphere is provided to prevent advance unit from becoming locked in an advanced position.

Idle Stop Solenoid — Idle stop solenoid is a two-position electrically operated control, used to provide idle speed as predetermined by adjustment of plunger. In energized position (ignition On, plunger extended) plunger contacts carburetor throttle lever and prevents full closing of carburetor throttle plates. This idle control, when de-energized (ignition Off, plunger retracted), allows throttle plates to close beyond normal idle position; thereby shutting off air supply and starving engine so that it will shut down without dieseling.

1970 Temperature Switch — The temperature switch serves a dual function in 1970 TCS system. Switch incorporates a terminal for TCS cold override circuit, as well as a terminal for engine overheat warning light. Switch is calibrated to operate between 65°F and 275°F. Whenever engine temperature is below 63°F, vacuum advance solenoid is de-energized allowing full vacuum to distributor vacuum advance. When engine temperature reaches 275°F or above engine overheating indicator light is energized. Vehicles equipped with hot override feature utilize a separate single terminal temperature switch. When engine temperature exceeds 232°F, switch de-energizes vacuum advance solenoid.

1972-74 Temperature Switch — Temperature switch is a two-position single terminal control which provides a path to ground, for cold override feature, when engine coolant temperatures are below 82°F (1972) or 93°F (1973-74). The Off or Neutral position is maintained at engine coolant temperatures above 82°F (1972) or 93°F (1973-74).

Transmission Switch — Automatic transmissions use a pressure sensitive switch which is activated by transmission fluid pressure. Manual transmissions use a switch which is activated by shifter shaft. Each switch is normally closed when installed, providing continuity through grounded housing. Vacuum is denied distributor vacuum advance unit as long as transmission switch points are closed.

1970 Relay Switch — Relay is an electrically operated on-off type switch. When coil is energized through temperature switch, it opens normally closed relay points thereby opening circuit to vacuum advance solenoid, which then de-energizes and opens vacuum port providing vacuum to distributor vacuum advance unit.

1972-74 Time Delay Relay — Relay is a transistorized timing device designed to delay circuit continuity for a minimum of 20 seconds, after transmission has been shifted into high gear. Delaying circuit completion delays vacuum advance. Any opening of transmission switch contacts (downshift) of more than one or two seconds, causes relay to recycle and deny vacuum advance for another 20 seconds. A transmission switch interruption of less than one second will disable relay and prevent vacuum advance until next upshift cycle.

NOTE — TCS system is designed so that in event of any TCS electrical component failure, distributor will receive full vacuum advance.

MAINTENANCE & TESTING

NOTE — No maintenance is required of any component in system, other than testing for proper operation. If any component is not functioning properly, it should be replaced.

Vacuum Advance Solenoid — Disconnect hoses and electrical connector. Connect a hose to distributor vacuum port on solenoid and blow into hose. Air should come out vacuum port to carburetor. Plugging vacuum port to carburetor should shut off air through solenoid. Connect a jumper wire from one terminal to ground. Connect other terminal on solenoid to a 12 volt source. Air should now come out vent port of solenoid. Plugging off vent port should shut off air flow through solenoid.

Idle Stop Solenoid — Check to ensure that solenoid is de-energized when ignition is off. If solenoid is energized (plunger extended) with ignition off, it should be replaced. Check solenoid plunger for free movement and proper adjustment.

Temperature Switch — Install vacuum gauge in line to distributor vacuum advance unit. With engine temperature below 65°F, observe vacuum gauge for a manifold vacuum reading. Replace temperature switch if vacuum gauge registers "0". On engines equipped with "Hot" override provision, connect hot override temperature switch connector and observe vacuum gauge. If engine temperature is above 232°F and vacuum gauge registers "0", replace hot override switch.

Exhaust Emission Systems

GENERAL MOTORS TRANSMISSION CONTROLLED SPARK (Cont.)

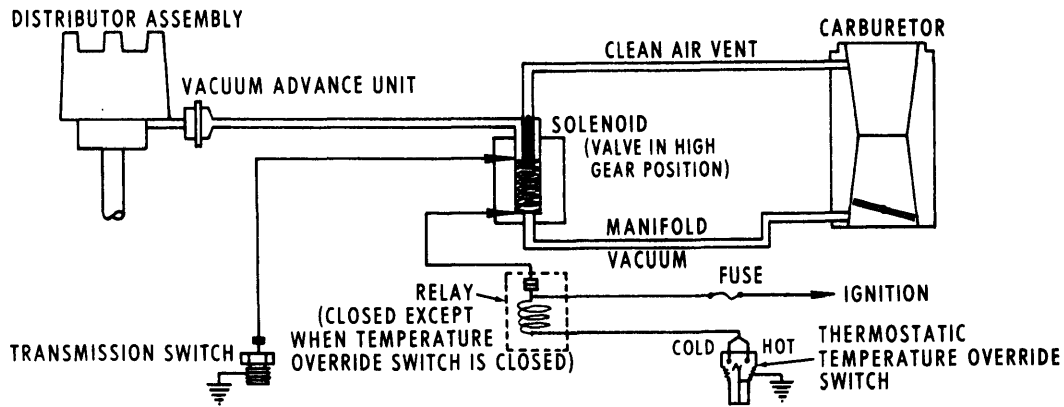
Transmission Switch — Connect vacuum gauge in line to distributor vacuum advance unit. Put transmission in reverse on Hydra-Matic or high on manuals and Powerglide. **NOTE** — Powerglide equipped vehicles must have rear wheels off floor and accelerated to permit shift into high gear. Observe vacuum gauge for a manifold vacuum reading. Replace transmission switch if gauge has a "0" reading.

1970 Relay Switch — Install vacuum gauge in line to distributor vacuum advance unit. Disconnect and ground engine temperature switch wire connector. **NOTE** — On engines equipped with hot override provision, disconnect and ground both temperature switch wire connectors. Disconnect and

ground transmission switch wire connector. Observe vacuum gauge for a manifold vacuum reading. Replace relay if gauge has a "0" reading.

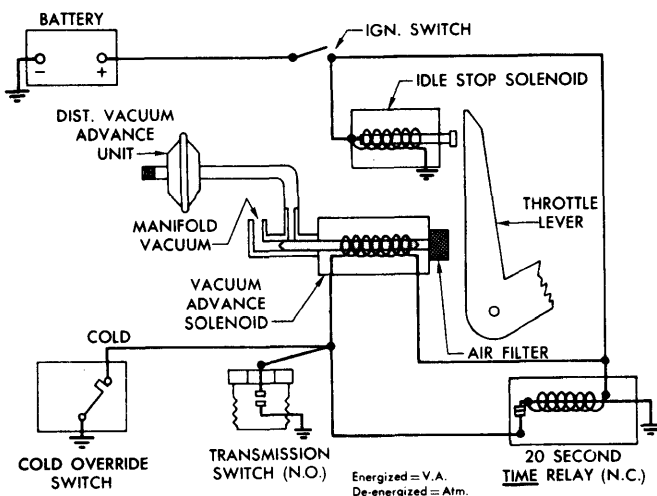
1972 Delay Relay — With ignition on, check for 12 volts at tan lead to relay. With 12 volts applied at terminal with tan lead, ground relay terminal with black lead, if after 26 seconds vacuum advance solenoid does not energize, replace delay relay.

1973-74 Time Relay — Remove temperature switch connector. Check relay to make sure that it is cool, then turn ignition on. Vacuum advance solenoid should energize for 20 seconds and then de-energize. If solenoid does not de-energize, remove blue lead from time relay. Solenoid will de-energize if relay is at fault.



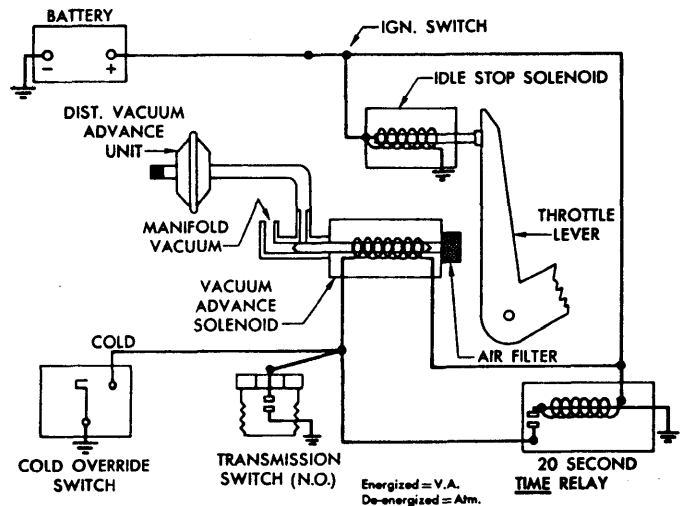
OGM01

1970 TCS SYSTEM



4GM02

1972-74 TCS SYSTEM (ENGINE OFF)

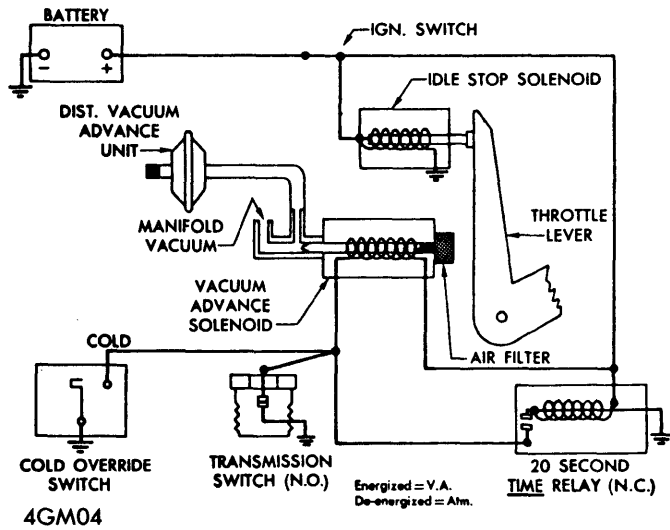


4GM03

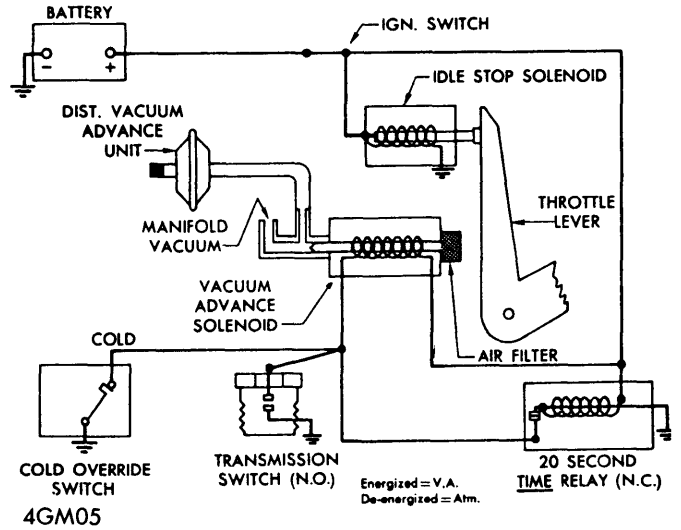
1972-74 TCS SYSTEM (LOW GEAR)

Exhaust Emission Systems

GENERAL MOTORS TRANSMISSION CONTROLLED SPARK(Cont.)



1972-74 TCS SYSTEM (HIGH GEAR)



1972-74 TCS SYSTEM
(COLD TEMP. OVERRIDE ENERGIZED)